

SOME WATER QUALITY PARAMETERS AND ZOOPLANKTON PERIODICITY OF THE BAGA IN-TAKE CHANNEL OF LAKE CHAD

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ABSTRACT

Assessment of some water quality parameters and zooplankton periodicity of the Baga in-take channel of Lake Chad was reviewed. Seven different species of zooplankton were identified at the two sampling stations of the channel. Each identified zooplankton species were grouped according to its major group of Copepods, Cladocera and Rotifera. The copepods dominated the total population with the highest number of occurrence as Cyclopoids species. There was a mark evidence of organic manure nutrient on total zooplankton population. Surface water temperature in station 1 ranged from 22.8-28.1°C the pH ranged from 6.10 – 7.12 while D.O ranges from 4.00mg/l -6.20 mg/l. At station 2, temp ranged from 22.0'28.10°C, pH ranged 7.1 – 8.6 while D.O. ranged from 4.00mg/l – 6.20mg/l.

INTRODUCTION

Lake Chad is centrally located in an ancient shallow basin on the edge of the Sahara in a region that has been tectonically stable (Beadle, 1974), but has been subjected to important changes in climate from the Pleistocene up to recent times. The severe recession of the lake water has altered not only the area, but the ecological and hydrological structure of the lake. What used to be open water has witnessed increase growth of aquatic and semi-aquatic weeds, which impede fisheries activities and navigation routes in the lake (Nwoko *et al.*, 1984). Lake Chad basin is a very prominent livestock and agricultural area and most investment in these activities depends on the neighboring countries (Niger, Chad and Cameroun Republics). The vast area of shallow water receives a daily average of 8 to 10 hours of intensive sunlight, the intensity of the sun being further enhanced during the drought periods. Nwoko *et al.* (1984) revealed that strong sunlight in an arid equatorial zone subjected to periodic drought phases produce sustainable high temperature which to influence the limnological regime, productivity and water resources of the lake.

Therefore, the resultant reduction in surface waters, water depth and near absence of open water might have brought changes in the lake and the Baga in-take channel. Thus, monitoring the physico-chemical variables and zooplankton in time and space is essential in establishing the trend of changes undergone by these variables. These variables may not exist independently and high level of some of these factors may cause pollution. Hence, it is important to know the water quality requirements for fish and fisheries, because an understanding of water quality is essential to the pond owners and aquaculturists to allow assessment and implementation of effective management strategies, as water quality is a challenging aspect of fish production. Adeniji and Ovie (1982) reported that, phytoplankton and other sub-merged aquatic vegetation remove carbon dioxide (CO₂) from the water body during photosynthesis and release dissolved oxygen (D.O) into it which is utilized by zooplanktons and fish for respiration and growth.

This research is designed to provide more recent/updated information on: the recent changes undergone by some important physico-chemical parameters that aid fish production; to assess the levels of primary productivity of the in-take channel of Lake Chad at Baga.

MATERIALS AND METHODS

The study started in the month of March to first week of June, 2009. When there was stability between the flood period and the lake water recession period. Two sampling stations were chosen along the Chad Basin in-take channel: Station 1: (Upper part of the channel) towards the open lake. Water in this area was devoid of weeds. Human and animal wastes were pronounced in this station. It is a major point for cattle grazing and drinking. Also the volume of water was at maximum level. Station 2: (Lower part of the channel). It was a landing site for many fishing and transport boats. The area was clean and clear of aquatic weeds, inputs into the water such as engine oils, petrol, and human activities were observed. The water body was most of the time stirred due to movement of boats. Samples of water were collected in each station weekly. The college fibre boat and 40 horse power engine were used for transportation to station 1 sampling point.

The methods used in sample collection, presentation and analysis were those described by (ALPHA, 1980). Parameters studied on each of the sampling stations were, water temperature, pH, D.O, secchi-disc transparency, conductivity and zooplankton estimates (Jeje and Fernando, 1986) method was adopted and (Adepoju, 1989) were used for estimation of zooplankton.

RESULTS AND DISCUSSION

The findings of this work revealed a wide range of variability in the water quality characteristics of the Baga in-take channel of Lake Chad. Tabular representations of such changes are made in the sections that follow. Equally, the result were statistically analysed and computed (Table 1 and 2). Interpretation of the results have also been attempted based on the information derived from the statistical analysis and known limnological principles. The total Zooplankton abundance occurrence is as summarized in Table 1 of the in-take channel as a result of animal waste/organic manure deposition. This data agreed with those of (Adeniji and Ovie, 1982) that: the predominant use of organic manure such as cow-dung, chicken dung and pig-dung in culture system is highly commendable as this is a major way of channeling animal waste into fish production system. This study on Assessment of some Physico-chemical Parameter and Zooplankton Periodicity of the In-take Channel of Lake Chad has highlighted the levels of primary productivity of the channel as revealed in tables 1 and 2. All the water parameters measured were within the tolerable limit of aquatic organism. This findings agreed with those of Gibons and Funk (1982) and Raji and Saidu (2001) that micro-organisms have proved to be valuable indicator apparent and suitable alternations in the quality of freshwater system.

Table 1: Comparative Variation in total Zooplankton density (Nos/l) at the upper (Station 1) and lower (Station 2) part of the Baga in-take Channel of Lake Chad.

Sampling Date	Upper part of Baga in-take Channel of Lake Chad (Station 1)	Lower part of Baga in-take Channel of Lake Chad (Station 2)
16/3/09	8.30	4.9
23/3/09	11.20	5.9
30/3/09	9.5	5.8
7/4/09	9.5	4.1
14/4/09	6.5	3.3
21/4/09	6.9	3.9
28/4/09	7.5	3.4
5/5/09	6.0	3.3
12/5/09	6.2	2.3
19/5/09	6.4	2.0
26/5/09	5.1	2.7
2/6/09	5.0	2.2

Table 2: Weekly mean variations in water quality parameters at the two sampling Stations of the Baga in-take Channel of Lake Chad (i.e Station 1 and Station 2)

Date	Stations	Temp. (°C)	pH (Unit)	D.O (mg/lit)		Conductivity	S.D. (m)
				Surface	Bottom		
16/3/09	Station 1	23.0 ^{oc}	6.10	6.2mg/l	5.3mg/l	310	0.2
	Station 2	22.0 ^{oc}	8.68	6.0mg/l	4.40mg/l	420	0.4
23/3/09	Station 1	23.0 ^{oc}	6.1	6.20mg/l	3.40mg/l	310	0.2
	Station 2	24.2 ^{oc}	8.1	6.0mg/l	3.1mg/l	420	0.4
30/3/09	Station 1	22.8 ^{oc}	6.8	6.2mg/l	3.0mg/l	300	0.2
	Station 2	25.4 ^{oc}	8.2	6.00mg/l	3.00mg/l	550	0.4
7/4/09	Station 1	25.8 ^{oc}	6.2	5.3mg/l	2.60mg/l	300	0.2
	Station 2	24.6 ^{oc}	7.2	6.10mg/l	3.40mg/l	400	0.4
14/4/09	Station 1	26.0 ^{oc}	6.0	5.20mg/l	3.40mg/l	310	0.2
	Station 2	25.0 ^{oc}	8.1	6.20mg/l	2.40mg/l	400	0.4
21/4/09	Station 1	26.8 ^{oc}	5.8	6.00mg/l	3.20mg/l	300	0.2
	Station 2	27.0 ^{oc}	7.1	4.20mg/l	3.00mg/l	380	0.4
28/4/09	Station 1	27.1 ^{oc}	6.2	4.00mg/l	2.80mg/l	280	0.2
	Station 2	26.5 ^{oc}	7.3	4.00mg/l	2.30mg/l	350	0.4
5/5/09	Station 1	27.8 ^{oc}	7.1	4.10mg/l	2.10mg/l	320	0.2

	Station 2	27.3 ^{oc}	7.3	5.30mg/l	2.30mg/l	300	0.4
12/5/09	Station 1	27.8 ^{oc}	7.0	5.00mg/l	2.60mg/l	320	0.2
	Station 2	27.4 ^{oc}	8.1	5.30mg/l	2.60mg/l	400	0.4
19/5/09	Station 1	26.4 ^{oc}	7.2	5.20mg/l	3.00mg/l	300	0.2
	Station 2	27.8 ^{oc}	7.7	5.40mg/l	2.90mg/l	400	0.4
26/5/09	Station 1	28.1 ^{oc}	7.6	5.10mg/l	3.00mg/l	280	0.2
	Station 2	28.0 ^{oc}	7.7	5.30mg/l	2.90mg/l	410	0.4
2/6/09	Station 1	26.4 ^{oc}	7.1	5.0mg/l	3.20mg/l	300	0.2
	Station 2	28.0 ^{oc}	8.2	5.4mg/l	3.00mg/l	410	0.4

The information derived from this research shall be useful research inference, basically to fisheries resource management due to level of exploitation and environmental degradation faced by the Lake Chad. More intensive, details and longer oriented research findings should be designed for future workers for the better understanding of the periodicity of these important aquatic organisms in conjunction with the limnological studies. Therefore, there is urgent need to constantly monitor some of these important water quality parameters in the in-take channel to ascertain the proposed operation of cage culture practice in the channel. Also the growth of macrophyte should be monitored to avoid eutrophication in the channel.

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